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ABSTRACT

This case study used both quantitative and qualitative methods to investigate students' perceptions of learning using a Web-based tutorial. Students participated in a Web-based tutorial to learn basic HTML as part of a graduate-level Web design course. Four of five students agreed to participate in the survey and interviews. After completing the tutorial, students' scores on Web assignments and responses to surveys and open-ended interviews were analyzed. Results indicate that although students mastered the material, perceptions of learning via the Web were vastly different. Findings indicate the need to investigate the broad issues of student's preference for text, the desire for more personal context and guidance during instruction, and possibilities of high performance for visual learners. (SLD)

Running head: PERCEPTIONS OF WEB TUTORIAL

Student Perceptions of Learning in a Web-Based Tutorial

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Abstract

This case study used both quantitative and qualitative methods to investigate students' perceptions of learning using a Web-based tutorial. Students partook in a Web-based tutorial to learn basic HTML as part of a graduate level Web design course. After completing the tutorial, student's scores on Web assignments and responses to surveys and open-ended interviews were analyzed. Results indicate that although students mastered the material, perceptions of learning via the Web were vastly different. Findings indicate a need to investigate the broad issues of student's preference to text, the desire for more personal contact and guidance during instruction, and possibilities of high performance for visual learners.

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Student Perceptions of Learning in a Web-Based Tutorial

The intention of research is to inform, to sophisticate, to assist the increase of competence and maturity, to socialize, and to liberate.

Robert E. Stake

The Internet has become firmly entrenched in colleges and universities around the world. It serves as an integral part of communication and research for students and professors alike. Moreover, for the past few years, the Internet has been used as resource for learning in the classroom; in fact, the Internet is literally becoming a part of the classroom. More than 2,200 institutions in 77 countries around the world now use WebCT.com and Blackboard.com has 1,900 customers ranging from University professors to corporations. Both these tools, by utilizing the Internet, allow learning to take place online. While the demand for such online courses is increasing (Hanna, 1998), some are questioning the effectiveness and utility of Web-based learning (McCollum, 1998). This paradigm shift is also bringing about serious discussion concerning the changing roles professors have on campus as well as the changes in student life on campus (McCollum, 1998). No one knows where this road is leading, but attempts are being made to understand this new way of learning.

New instructional methods are being incorporated in different ways and to varying degrees across the world. Harasim, Hiltz, Lucio, and Turoff (1995) have divided learning with the Internet into three modes of learning networks: online, mixed and adjunct. In the adjunct mode, students used the Internet to communicate with teachers and other students outside the classroom. The mixed mode occurs when online tasks are an integral part of the course. In the online mode, the majority of instruction, communication, and interaction take place online.

To date, much of the research has compared the traditional classroom to the virtual classroom. White (1999) compared the effectiveness of Web-based instruction with classroom instruction and found no significant difference between the two groups. Schutte (1996) found that students taught over the Web performed better than those in a classroom setting when comparing one junior level Sociology class. Another study found no difference in the results of an online group and a traditional group, but did find that some students preferred "virtual" instruction to the traditional lecture format (Sankaran, S., Sankaran, D., & Bui, 2000).

Besides these comparison studies, other research has attempted to understand how students view online instruction. Jian and Ting (1998) sought to understand variables related to perceptions of learning in a Web-based course. They found that gender and age had no affect on perceived learning. A case study investigated six student's perspectives in a Web-based distance education course and found that difficulties inhibited the learning experience (Hara, 1998). Another study found that most students, after some initial difficulties, enjoyed the mixed mode of classroom instruction (Lee, 2000).

This tutorial does not fit neatly into one of the three modes. The tutorial was a component of a traditional course where the students met three hours a week but was not discussed in the classroom. Unlike the adjunct mode where students discuss online, these students did not discuss the tutorial with each other or the instructor online (although they could send specific questions about the tutorial via email to a graduate assistant). The tutorial, if viewed as a self-contained instructional tool, would fall into the online mode, but it is a far cry from a graduate level course. This tutorial partly falls into the mixed mode, but HTML was not discussed in the classroom—nor was the tutorial was not major component of the course. The

tasks for the class utilized HTML in designing Web pages, but the course emphasized the design elements of Web pages and the creation of Web pages.

For those not familiar with HTML or Web design, an appropriate analogy would be an English Composition course. The course itself would tend to focus on writing style, but students would go to the Web to learn grammar. The teacher would not teach grammar, although without proper usage the students would not succeed in the course.

One reason behind this study is the paucity of research in the design of online learning. Results of tests scores and student surveys (which has been the bulk of the current research) do not help us to understand what is effective when designing online instruction. Sherry (1995) notes that many times designers focus on the new technologies available without considering the needs of learners. Quantitative research might judge a tutorial successful, but designers would not know why elements were successful in creating a positive learning environment.

The aim of this paper is begin to bridge that gap. A case study was chosen specifically because the researches hoped to understand what students think about the online learning process. It is hoped that we as teachers can learn from the voices of those who have been through the process itself. Do students find the process useful or would they rather enroll in a tradition course? How effective was the course in teaching them how to create Web pages with HTML? What specific design elements helped them comprehend and master the material? These were some of the questions we sought to answer when the project began. Of course, it was also assumed that the students could teach us as well.

Methodology

This case study used quantitative and qualitative methods to collect data. Results of the tests and assignments were analyzed using quantitative means. Qualitative and quantitative

results were collected from two surveys and one open-ended interview. Students were given fake names in order to track individual performance. After the weekly lesson, students completed the accompanying online test. After completing the test, students were given an assignment to be completed within one week. Students completed the first survey midway through the tutorial and the second survey after the last lesson.

Interviews were conducted after the students had completed the tutorial. The researchers created a list of open-ended questions before the interviews took place. The interviews were recorded and later transcribed. Pre-established codes were developed before analyzing the transcripts, but new ones were also developed while examining the transcripts (Stake 1995).

Participants

The participants were graduate students enrolled in an Introduction to Web Design class at the University of Arkansas, Fayetteville. Seven students completed the first lesson of the tutorial, but two withdrew from the course after the first week, leaving five who completed the tutorial. Four students agreed to participate in the surveys and interviews. Three had recently started working on a Master's Degree in Educational Technology and one was working on a Doctorate in Counseling. Three were male and one was female. One student was an international student whose native language was not English. None had extensive knowledge of computers beyond using computers for word processing, email, and browsing the World Wide Web. Two had learned basic HTML in a previous class, but had not used HTML outside the class. None had ever learned over the Web.

Design of the Tutorial

This tutorial was originally three Web pages coded by a professor to teach students the basics of HTML[1]. Working with the professor, the designer began to adapt the original three

pages into distinct lessons. From this came the idea of developing a Web-based tutorial that would take advantage of some of the possibilities of Web-based learning. The design included images and example pages, took advantage of JavaScript to include online self-quizzes, and utilized CGI scripts to include online tests which would be emailed to the instructor.

Using Dreamweaver, the three original Web pages were broken into five lessons. Lesson one dealt with basic HTML tags. Lesson two taught how to change text size and styles. Lesson three discussed how to add color and images to a Web page. Lesson four dealt with tables and lists. Lesson five covered the addition of internal and external links to a Web page using text or images. Each lesson followed a similar format. The first part of the lesson introduced the student to the topic and explained the concepts of HTML. Colors, images, and examples were added to assist the student comprehend the material. The second part of the each lesson consisted of an example Web page that contained the specific elements of HTML. Unlike the first page, the source-code for this page was arranged so students could easily understand how HTML tags function. Students were instructed to view the page source that allowed them to compare the Web page and HTML coding at the same time.

At the end of each lesson, students completed an online test. The test page was a Web page that contained blank form boxes. (A form box allows one to type information into a Web page which is then sent over the Internet, such as when one uses a search page on the Internet). After they had completed the test, students pressed the submit button which uses a CGI script to send their answers to an email address.

Lessons two, three, and four contained a self-quiz that was not included in lessons one and five. The self-quizzes were adapted from a fill-in-the-blank short answer quiz for international student studying English.[2] Students answered each question by typing their answer

in a form on the Web page. When finished, students pressed a "check answers" button at the bottom of the page. A blue check mark or red "x" then appeared next to each answer. The designer used Dreamweaver to change the appearance of the page and edited the JavaScipt to change the answers.

The HTML self-quizzes and tests consisted of three types of questions. The first asked the student to type the HTML tag necessary to create a certain feature to appear in a Web page. In the second type, students had to type the code that corresponded with the features present on the page. The third type required the students to correct the mistakes in a line of HTML code. These questions required the students to perform the same tasks that would be required when writing the HTML code for a Web page. When designing a Web page, one must know specific codes to create certain elements (i.e. the first type of question). The second type of question was intended to allow the students to practice creating what they might visualize in the head. The third type of question required the students to find the mistakes in the HTML coding. This is a vital skill that a designer will perform over and over when trying to find mistakes in one's own code.

Procedure

Each week, students spent one hour in a computer lab working on the tutorial. Students did not interact with one another, but were allowed to send an email that would be promptly answered. Working in a computer lab simulated a type of Web-based learning that not all students would have if they were learning from home. The computers in the lab were less than a year old; many students will own computers that are much older. Also, the Internet connection to the Internet was extremely fast; many students at home will have a slow connection to Internet.

Data Collection

The points possible for each test and Web page assignment depended upon the number of HTML elements in the answer with each HTML tag counting as one point. Students were then given a percentage grade. The surveys asked demographic questions, questions about previous computer experience, and perceptions of the tutorial. The interviews asked open-ended questions.

Results

Overall, the students scored exceptionally high on both the tests and Web assignments. (See Figures 1 and 2) However, two students scored very low on the first test. Students took the first two tests anonymously, but from the interviews, it is safe to assume the two students who withdrew from the class after the first lesson were the two with low scores (23% and 30%) on the first test. (The low scores were eliminated from the study). As table 1 shows, the students scored high on tests two, three and four. A slight drop occurred in test five, and one student did poorly on the final test (although the Web assignment score for this student was 100 percent).[3] A statistical analysis was not run on the results of the test, however the average score for the tests, *not including the two low scores from the first lesson,* was 95.4 percent. Results from the Web page assignments were similar. Each assignment was graded on a scale of one to ten according to the guidelines in Table 1. When averaging the student's scores for the five assignments, the lowest average student score was a 94 percent with the other students scoring 97 percent or above. The average for all the assignments was a 97 percent.

Analyzing the test and assignment results alone, the tutorial was a success. However, the researchers did not want to judge the success of the tutorial by quantitative methods alone. Furthermore, we can assume that graduate students are motivated to learn the material and would

likely succeed in learning HTML regardless of instructional method. The ultimate goal of this project was to discern opinions of learning via the Web and the tutorial. The intention was not to "confine interpretation to the identification of variables and the development of instruments for the report" (Stake, 1995, p. 8). By analyzing the transcripts, the researchers searched for themes and interpreted the results to draw conclusions about the students' perceptions.

Students responded to three questions design to determine the usefulness of the tutorial. When asked if they would do the tutorial again, three stated that they would do the tutorial again; one stated otherwise. All four students answered that they would recommend the tutorial to another student. In response to the question of whether they would enroll in a course with a similar tutorial, three stated that they would enroll while one commented that a similar tutorial "would not keep [the student] from signing up."

Although the initial response was favorable, several answers were conditional. One student stated a tutorial such as this should be simplified so the initial confusion would be lessened. One student who would recommend the tutorial to someone else noted, "it works for some people." Thus, the student acknowledged that some might not find the tutorial useful. Finally, the student who would not take the tutorial did not answer "no" to the question but instead responded, "I prefer a little more personal interaction."

When discussing the advantages and disadvantages of online learning students came agreed on several themes. They enjoyed the opportunity to access the instruction at anytime from anywhere. They strongly supported the idea of being able to learn at their own pace. If they understood the material, they could quickly finish; or, if they needed more time to study the material, they did not need to worry about slowing down the other students or about falling behind with classroom instruction. Web-based learning also allowed them to return to the

instruction at a later time should they need to review. Not everything was positive, however. Students recalled the inherent problems that occur with technology. Although in theory students could access the tutorial at any time from anywhere in the world, the dial-up numbers are often busy. Also, once someone does connect to the Internet, the connection can be dreadfully slow or the Web server can be offline.

The interviews revealed numerous themes when trying to discover opinions and perceptions about the effectiveness of the tutorial and Web-based learning. The researchers expected to find themes dealing with contact, feedback, book vs. Web, and comfort level. Other themes that were found when analyzing the transcripts were frustration, learning style, and visual design. From the beginning perceptions varied. Two students stated their initial reactions were favorable. While somewhat anxious about learning over the Web and on a computer for the first time, one felt comfortable after a few minutes. Another student found the format awkward and mentioned, "I like to have my instructions here and screen here." This student was not confused or overwhelmed like one of the other students. One student "had the sensation of learning," but was completely overwhelmed by the first tutorial experience. For this student, the instructions were not simplified enough and on the first day there was "too much new stuff going on at the same time."

The students also expressed completely different ideas about the effectiveness of Web-based learning compared to traditional, printed tutorials. The focus seemed to revolve around the idea of printed text, or as one student strongly stated, "I cannot let go of paper." A different student actually printed out the material and placed it in a folder to review at a later time. This same student did, however, like the format the tutorial and stated, "it was much more helpful than a book because you got to do things right away." One student who thoroughly enjoyed the

tutorial and Web experience noted that he had learned a computer program with a book and felt that Web-based instruction covered much more information at a faster pace. This same student also mentioned the visual aspect of learning on the Web (and from a screen in general) and the visual design elements in the tutorial. The colors and images assisted in helping to remember the HTML codes and context of the material.

A lack of personal contact is one aspect of Web-based learning (and computers in general), and the students' responses on this theme reached some consensus. As stated earlier, one student would not repeat the tutorial because of a lack of personal interaction. While the other students did not feel this strongly, they did express a wish for more feedback and a possibility to ask questions. One student did state, "I don't need that," but this did not imply that the *lack of contact* enriched the Web-based learning experience.

The word "frustration" was mentioned when discussing the lack of contact and similar aspects of the tutorial. Because they could not ask a question, the students had to work through problems themselves which was more time consuming. They also found the self-quizzes frustrating, but after discussing the quizzes, incorrect answers might have been caused in part by a technical glitch in the Web page. Despite their frustrations, the students did feel comfortable with the tutorial. When asked to state their comfort levels each week on a scale of one to five (with one being low and five being high), responses did not differ markedly. One student ranked all 5's; another ranked all 4's. The student who was overwhelmed at the beginning of the tutorial gave the first lesson a "1," but by the later lessons felt comfortable enough to give both lesson four and five a "4."

The students agreed on the theme of guidance and the tutorials layout. Most indicated that more specific directions on the assignments would have been helpful. They agreed that this

lack of guidance did not inhibit their learning, but more guidance would have made them feel more comfortable. The students did not express strong opinions about the design elements and layout of the Web pages. Most stated that is was clear, but the comments were not actively positive. Statements such as "it was fine," "not too bad," and " nothing obnoxious" were common. Overall, students did not state a strong opinion either way.

Discussion

The results of the tests scores and Web assignments showed that the tutorial was a successful tool in instructing students and that the students were able to master basic HTML. The interviews, however, indicated that completing the tutorial successfully did not translate into complete satisfaction with the Web-based learning process. Frustration with the tutorial and a lack of personal contact let to dissatisfaction. Students did find several positive aspects including accessibility, instant results, and ability to learn at their own pace.

The lack of personal interaction was a recurring theme and was the main reason one student would not repeat the tutorial. It is unclear whether more email contact would have fulfilled this need. While some stated that more feedback via email would have been preferable, there was a strong desire to be able to ask a question when ever one needed assistance. Had they been able to ask questions, the learning experience would have been more enjoyable for most, if not all. It is unclear if personal contact would have also fulfilled the wish for more guidance when learning HTML. It is unclear whether the lack of personal contact impacted the students' comfort level. Further research into this issue is greatly needed, as it is one of the main issues in online learning. None of these students had learned over the Web, yet comfort levels varied greatly. Comfort was not the result of familiarity with computers and did not increase as the course went on. Further research could attempt to investigate how learner's attitudes change

over time. Will most students enjoy online learning once they become accustomed to the format or will some never enjoy this method of instruction?

Among this group of students, the wish and need to possess a hard copy of the instruction was strong. They would have been better served had they been provided with a copy of some instruction ahead of time. This could, however, be a result of learning style. Although no attempt was made to categorize students according to learning style, one did directly state that the visual aspect of the tutorial enhanced the learning process.

The students did not express a strong preference either way when asked about the design elements. It was hoped to gather clues from the students as to whether certain design elements were effective, but little data were collected. Since this was the first time these students had participated in a Web-based learning, the students had nothing to compare. Even assuming they had, the results of this study highlight the need to evaluate the success of specific aspects of online learning. When considering the rapid changes will undoubtedly continue to take place, instructors must develop ways to continual assess successful elements of online learning.

Online and distance education will likely continue to become more prevalent in schools. Therefore, it would be wise to develop ways for teachers to identify those students who will require more personal contact. Although, from this project it seemed that "virtual contact" was not the contact the students wanted, it is possible that correct "virtual contact" would be successful. Most should continue to compare the two forms of contact in an academic setting.

Of far greater importance is how we as teachers should adapt curricula to meet the needs of different types of learners. If visual learners find this mode better for them, should we adapt traditional classroom settings to allow them to experience this type of learning? If teaching an online course, should one attempt to distribute the material as a hardcopy as well, or should this

be the responsibility of the students? Another related question we should address: to what extent should teachers be expected to adopt instruction to meet learner's needs?

The teacher's role will undoubtedly change as online instruction becomes more prevalent. Understanding this change should become a focus of all involved in education. Ways must be developed to recognize effective online teaching methods, and, even more important, we must ensure this information reaches those who will be conducting online education. Debate should also be encouraged so educators make changes because they are certain it will enhance the learning of students, not simply because technology becomes available. Dialogue must exist between designers and educators to ensure the quality material that reaches students. Finally, advances in technology must never hinder our vision to deliver quality instruction.

The designer would like to extend a special thanks to Dr. Linda Jones and Doug Mills for providing some of the original code and their help in making the tutorial possible.

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Table 1: Grading Guide for Web Page Assignments

10	No errors	5	Did not understand how one tag worked
9	Understood concepts. One or two typos	4	Did not understand how two tags
8	Understood concepts. Several typos	3	Did not understand three or more tags
7	Understood concepts, one tag error	2	Did not understand concept of any tags
6	Understood concepts, one tag error and typo	1	Assignment not completed

Table 2: Themes Appearing in the Interviews.

Usefulness	Number of comments	Quotes
Would do the tutorial again	3 yes 1 no	"I would do it again, but it needs to be a little more idiot proof for people like me." "I prefer a little more interaction"
Recommend it to someone	4 yes	"It works for some people and for others it doesn't." "Some are going to go to Barnes and Noble"
Sign up for a course with similar tutorial	3 yes 1 neutral	"It would not keep me from signing up."

Advantages	5	"Can learn whenever you have time"
Disadvantages	3	"Lack of interaction" "Slow connection at home"

Effectiveness	Number of comments	Quotes
First Reaction	3	"I was anxious because of my lack of computer background. As soon as I started I got comfortable right away" "I like to be able to practice immediately" "I like to have my instructions here and screen here"
Learning style	2	"It's more in line with the learning style I am most comfortable with"
Frustration	8	"Not having immediate feedback from people is always frustrating." "I did not like having to toggle back and forth"
Virtual Design	4	"The more I do it, the easier it is for me, but the first time everything is so new that there is too much new stuff going on at the same time." "For some reason it gets in your brain. There is something very visual…it sticks in your head when you see it on a bright screen,"

Contact	5	"I really would have rather been able to talk…just say I am hung up here, what annoying thing am I missing…and having someone else say 'check your backslash'"
Book vs. Web	6	"I have done it that way [learned software] and I already knew the information. I think we did not cover nearly as much information. This works very fast." "I was much more helpful than a book because you got to do things right away." "I cannot let go of paper. I like the hardcopy." "I ended up printing out the Web site."
Online quizzes and tests	5	"I like the fact that I had to write something because the reality is I don't get to use multiple choice when I use HTML [self quiz and test]" "I liked the idea of you doing it. …each lesson gave you something to do, to produce, to see if you know how to do it."
Comfort learning over the Web week by week 1-5	3	"Five all the way through" "A four" "Week one, 1. Two and three, 3. Week four and five, 4"

Figure 1. Scores from the tests

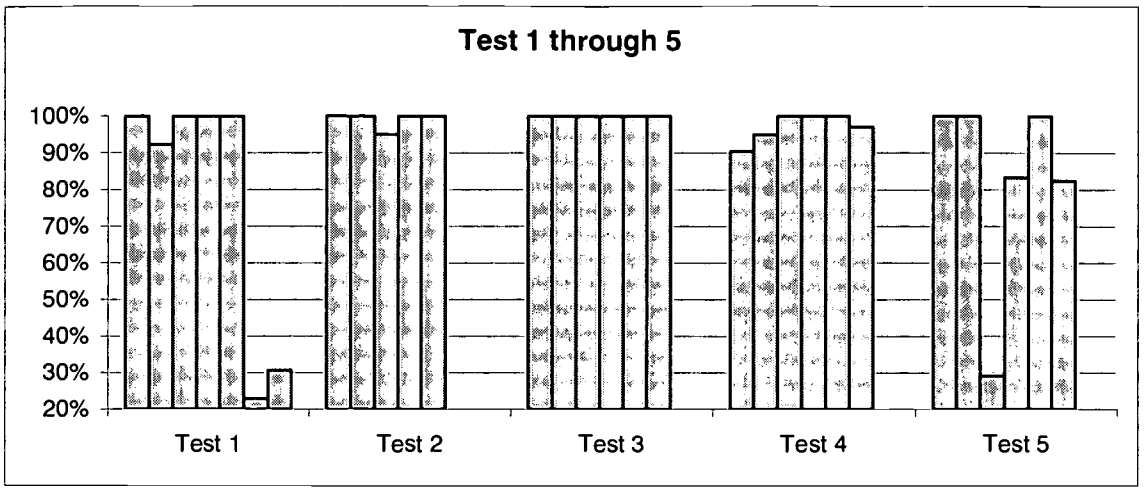


Figure 2. Individual performance on assignments

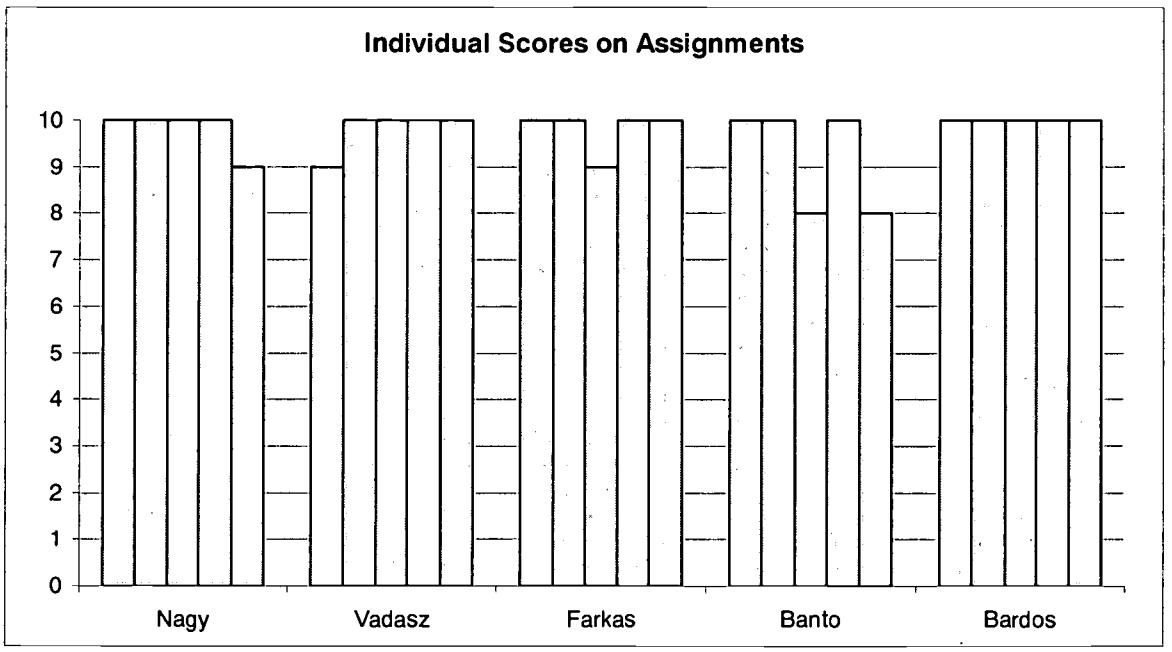


Image 1. Instructional page

 your text would go here - Place any word(s) to be **bolded** between the two tags seen here.

 your text would go here-Place the word(s) to be *italicized* between these two tags

<u> your text would go here </u>-Place the words to be underlined between these two tags.

Here are a few examples:

If you type the HTML code (without quotations of course) "this text is bold" it would appear: **this text is bold**

If you type the HTML code " this text is italicized" it would appear: *this text is italicized*

If you type the HTML code "<u> this text is underlined</u>"it would appear: this text is underlined

Finally, you can also center text with the tag to center any words you want

This text is center and bold!

In the above, the coding was written as follows:
This text is centered and bold!

Be sure to notice the order of the tags. The order is always reciprocal.

Image 2. Example page

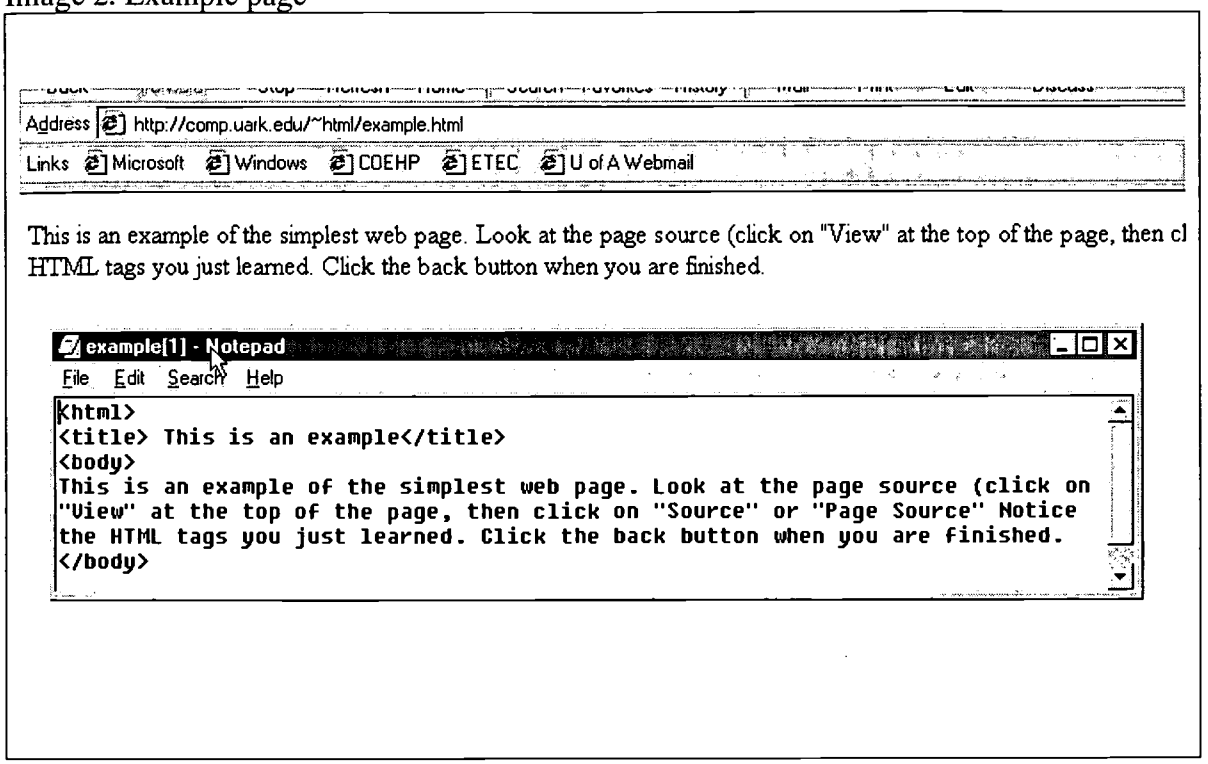


Image 3. Self-Quiz

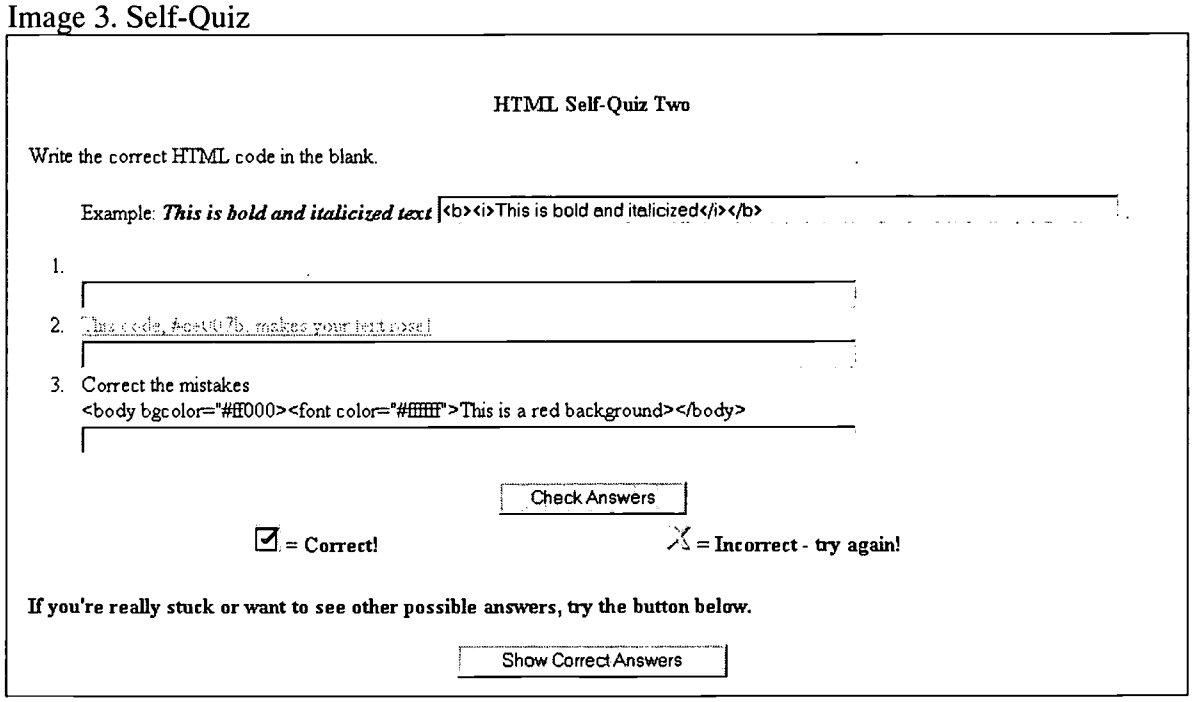
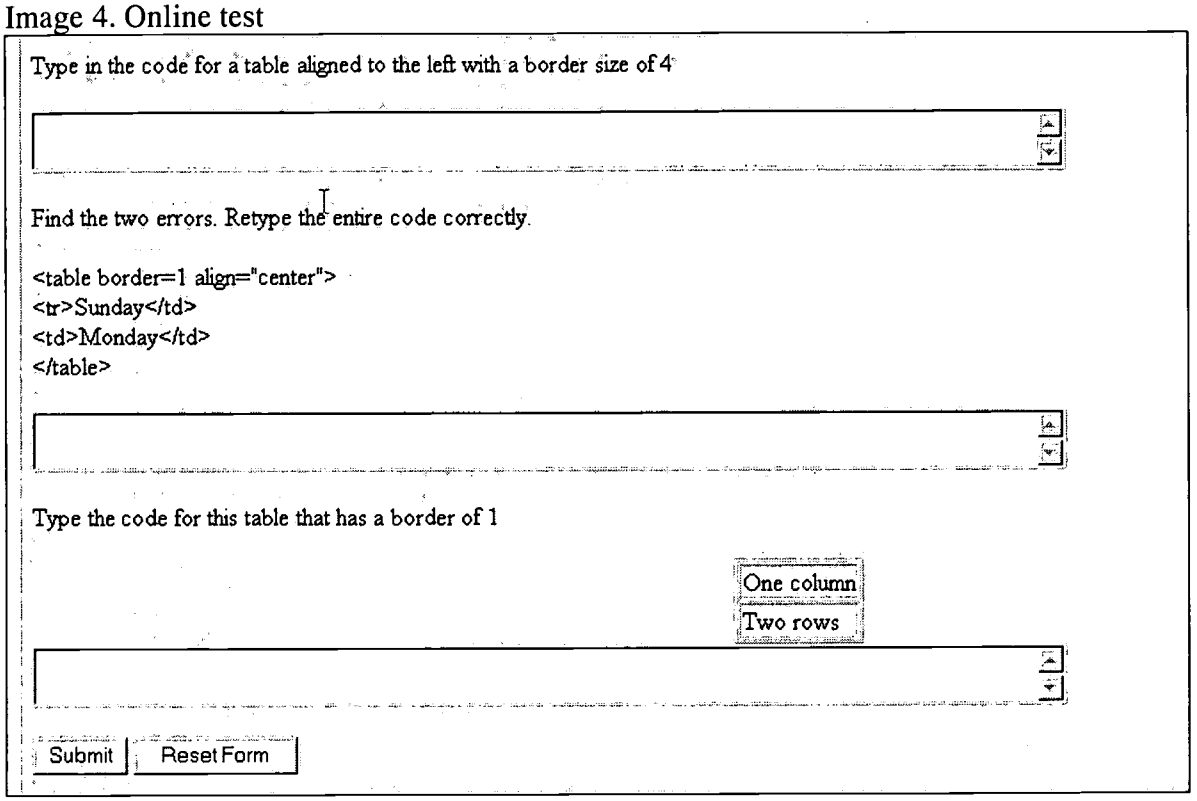


Image 4. Online test



[1] Linda Jones, Assistant Professor of Instructional Technology at the University of Arkansas wrote the original Web pages

[2] Doug Mills of the Intensive English Institute at the University of Illinois, Urbana-Champaign created the original short answer feedback pages which were then turned in the self-quizzes contained in the tutorial.

[3] In the interview, it was stated that the student confused the idea of hyperlinks and instead thought the test asked the student to type in the code for blue, underlined text.

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